Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Examination, Fall 2024
Course Code: CSE228, Course Title: Theory of Computation
Level: L2 Term: T2 Batch: 64

Time: 02:00 Hrs   Marks:40

Answer **ALL** Questions
*[The figures in the right margin indicate the full marks and corresponding course outcomes.
All portions of each question must be answered sequentially.]*

Q1	a)	Consider the following CFG: P → ABCD A → aA | cC | oD | iC B → ov | ovC C → id | id-D | ε D → 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 **Experiment** the above CFG to find out if the above mentioned CFG is ambiguous or not for the string **covid-19**.	[3]	CO2
	b)	Apply the concept of Push Down Automata (PDA) to accepts the language over alphabet {0,1,c}: L = { wcw^R, where w^R is the reverse of w and w ∈ {0+1}* }. After designing the PDA, **Experiment** the validity of the string **10011c11001**	[7]	
Q2	a)	Consider the following CFG: $S → OSS \| A$, $O → + \| * \| /$, $A → a \| b \| c$ **Analyze** this CFG for the string **+a * b /ca** to Perform the Left most derivation, Right most derivation, also Generate Parse Tree	[5]	CO3
	b)	**Drive** the following regular expression into CFG: $0*10(0+1)^*$ Using the generated CFG: **Discover** whether the strings **101001**, and **011010**, are **accepted** or **not accepted**.	[5]	
Q3		Consider the following grammar: S → ASB A → aASAB | a | ε B → SbS | A | bb Perform the following steps: i) Eliminate useless symbols from the grammar. ii) Remove unit productions from the grammar. iii) Eliminate epsilon (ε)-productions from the grammar. iv) Convert the resulting grammar into Chomsky Normal Form (CNF).	[10]	CO3
Q4	a)	Propose the Pumping Lemma for the language A = {$a^i b^j a^{ij}$ | i, j >= 0} is not regular.	[5]	CO4
	b)	Determine a Turing Machine which recognizes the languages L = { $a^n b^{2n}$ | n >= 1}	[5]	